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# Plantsmen in Profile, II: Albert Greenberg, Cecil E. Houdyshel, Frank H. Michaud

Mary H. Moon

## Albert Greenberg

Since the last war, renewed interest in the hobby of aquarium-keeping, and especially in tropical fresh-water fishes, has made aquatic plants for aquaria an increasingly important item in North American horticulture. Our horticultural literature has not only failed to keep pace with this increasing interest in aquatics, however, but too often has ignored it, though a number of journals in the world devoted to the aquarium, and in which the emphasis is on tropical fish, have frequent articles on aquarium plants.

In the American journals one often finds contributions from Mr. Albert Greenberg or references to his Everglades Aquatic Nurseries. His wholesale-retail firm is the largest tropical fish and aquatic plant propagating center in the country; the variety of his inventory of aquarium plants is believed to be the largest anywhere.

To those unfamiliar with aquatic plants and tropical fish culture, a visit to these nurseries offers an opportunity to see not only many kinds of plants and fishes in springs, ponds, and indoor tanks, but also to become acquainted with the propagating techniques used. Mr. Greenberg's firm has its headquarters in the residential district of northwest Tampa, Florida, and its nurseries and propagating areas at a forty-nine acre tract of ponds and springs nine miles northeast of the city.

In Tampa, four enclosed shed-type concrete greenhouses provide shelter for fish and plants propagated in concrete tanks. The tanks are twenty to thirty inches high, about four feet wide, and eight feet long, and are built in rows the width of the greenhouses, with walkways between the rows. Each tank contains one species or variety of aquatic plant and some fish.

The culture of these aquatic plants is not easy. Blue-green algae are perennial pests and a certain type of snail (Ampullaria cuprina) is introduced into the tanks to help destroy these algae as well as to take care of decaying vegetation. Most aquatic plants

are propagated only by vegetative means, and some, such as the rare and valuable Madagascar Lace Plant (Aponogeton fenestralis), are propagated only by division, a slow and costly method. Consequently, for these the supply is short, the price is high, and the propagator may get no appreciable return for the time-consuming care in providing some of them. Mr. Greenberg's plants of Aponogeton fenestralis do set seed but, though these germinate easily, most of the seedlings survive only until they are about an inch high, and very few grow to be full-size specimens. When a better method of culture has been devised to bring these seedlings to maturity, this beautiful rarity will be more readily available to the public at a lower price.

Besides these difficulties, some aquatic plants are finicky about the amount of light they receive. The Madagascar aponogetons are again a good example, for they thrive only with top light, and soon become sickly when given the side light of the home aquarium. For this reason, plants grown in the aquatic plant greenhouses receive mostly overhead light. Optimum water temperature is another factor to be determined and provided for each kind.

The nursery outside Tampa is a veritable botanic garden. Since 1938, Mr. Greenberg has been gradually reclaiming it from swamp land by digging drainage canals and using the fill from dredging to build elevated trails.

This property was purchased largely because its original eleven crystal clear springs assured a constant supply of running water for the ponds he later developed. Tropical fish and attractive aquatic plants now abound in them. Generally, each of the hundreds of ponds houses only one kind of fish and usually only one kind of plant, thus preventing hybridization. Many kinds of fish are left in ponds all year, but the less hardy ones are transferred to indoor tanks for the winter months.

A new greenhouse was built at the park in the early 1950's, and because of the increasing demand for aquatic plants another is now under construction. It is estimated that three-fourths of this acreage and greenhouse space are devoted to tropical fish and the balance to growing aquatic plants. Seventy-five percent of the plants offered are raised at the nurseries. The rest come directly from the wild - some from this country, more from abroad.

Visitors are welcome to visit the park on weekends and holidays, and hundreds come to watch the fish and to enjoy the many nature trails. The trails are also used in nature-study activities by Boy Scout troops from Tampa and surrounding communities. As much of the natural vegetation as possible has been preserved, with added naturalistic plantings of exotics. A large number of huge old oaks, laden with Spanish moss, are growing near several of the springs and other old trees have also been preserved.

Fig. 21. Albert Greenberg.

One spring in the park is of particular interest because a local Baptist congregation is permitted to use it for their baptismal services, and a set of steps was built into the spring for their convenience.

The development of this property and business represents the fruition of Mr. Greenberg's early dreams of one day being able to devote all his energies to the raising of tropical fish and aquatic plants. From his youth he had been surrounded by persons interested in plants and fish. He remembers enjoying visits with his grandmother, noted for her "green thumb." His uncle, Mr. M. Dagobert, born in Germany and trained as a plantsman in Berlin, later became a well-known gardener and florist in Chicago. His father had been employed in the wheat brokerage business in Europe, before he came to the United States, where he became interested in fish farming and distribution in the Midwest.

Mr. Greenberg was born aboard a British ship in the Black Sea in 1896 and was registered as an American citizen with the American Consul at Odessa. He was raised in Chicago, attending grammar and high school there. When World War I broke out, he left the University of Illinois where he was a freshman and enlisted in the Navy. His post-war job as a traveling salesman for a Chicago chemical company took him through the southern states. Through this opportunity he became familiar with the southern states and selected the present locations at Tampa, Florida, for the site of his business and in 1931 founded the Everglades Aquatic Nurseries.

The firm covers such a large area and deals with such a wide variety of tropical fishes and aquatic plants that a staff of twenty-four persons is now employed full time. Two of these men are specialists in fish propagation and two more are plant specialists. Mr. Greenberg has provided in his will that five of his employees, each of whom has been with the firm for 22 to 25 years, will eventually inherit the business. All of his employees may purchase stock in the firm.

Mr. Greenberg's own interest has been primarily in aquatic plants rather than tropical fish. Among other places, he has been to Africa, Madagascar, Honduras, and Cuba in search of rare and unusual aquatic plants to introduce through his firm. The Madagascar trip in 1947 was a particularly discouraging experience, for all the living material he had collected and specially prepared for ocean shipment was washed overboard and lost during a short but devastating storm.

Besides searching for rarities himself, he has agents in Europe, South America, Central America, and Asia looking for new kinds of plants and fish that might prove to be valuable additions to his extensive list. At present he is making arrangements to im-

port from a German specialist in Cryptocoryne many of the kinds of that genus of aquatic aroids that are not yet known to be offered by any American firm.

Because of current lack of knowledge of the correct scientific names of many of the aquatic plants in the trade, it is sometimes difficult to refer by scientific name, and with desired accuracy, to many of the kinds that are offered. Mr. Greenberg follows the conventional practice of giving descriptive English names to his plants. The difficulty in this practice is that these coined and so-called "common" names may confuse the unwary and the novice as to the botanical relationships of the plants, rather than assist in identifying them. For example, the "Underwater Banana" (Nymphoides aquatica) bears no relationship to the banana, the "Underwater Palm" (Juncus repens) is no palm, nor does the "Green Water Rose" (a species of Samolus) belong to the genus Rosa. "Baby's Tears" is unrelated to Helxine Soleirolii, the Corsican moss-like plant more commonly known by that name. And so it goes.

Four rare plants on his list whose botanical standing is certain are Anubias lanceolata (listed by him as the "African Cryptocoryne"); Aponogeton fenestralis (Madagascar Lace Plant); Aponogeton ulvaceus, a related plant; and "Neobeckia lacustris" (=Armoracia aquatica). Mr. Greenberg's list is long and varied, but his major specialties are species and varieties of Cryptocoryne (pronounced crip-toe-co-rýe-nee), Aponogeton, Sagittaria, Echinodorus (the sword plants), and Vallisneria (eel-grass).

One of his major novelties is a hybrid he produced in the genus Aponogeton in the early 1950's. It is a cross between A. fenestralis, the beautiful Lace Plant, and A. crispus. The former has fenestrations or "windows" in the leaves, openings formed between the veins. The latter is a strap-leaved type without prominent veining. The hybrid is brighter green and is more vigorous than either parent, has more conspicuous venation than has A. crispus, and is distinctive in having its "windows" covered with a membrane formed of a thin layer of cells. It seems to be sterile, and at present Mr. Greenberg has only a few plants which must be propagated vegetatively. They are not yet offered for sale, nor has the hybrid been named. However, it promises to be a valuable addition to aquaria and, when the difficulties of propagation are overcome, should prove to be popular.

This nursery is important to scientists as well as to the trade. It provides an unusually fine "laboratory" for icthyologists to study tropical fish. To accommodate scientists and their families, Mr. Greenberg has built a guest-house in the park appropriately called the "Patch House." It was constructed during the last war when

new lumber was virtually unobtainable and old lumber was scarce. Hence, wood from packing crates and old boards of odd sizes were used for the exterior, giving it a patchwork-quilt appearance. Even under the paint one can identify the origin of some of the pieces. The exterior belies the comfort of the rooms inside, equipped with modern conveniences for family living.

Mr. Greenberg encourages botanists, too, to make use of his "Patch House." The difficulty for the botanist is that the plants available for study are grown submerged, the equivalent of flood stage in their natural haunts, and therefore are in a vegetative state. It is only when in flower and fruit that many of these plants can be accurately identified and many aquatic plants flower in the wild only in the "dry" season, when water levels are low and at least some of the parts of the plants are above the water. Because aquatic plants are becoming more widely accepted as ornamentals in their own right, and not merely as a background for displaying tropical fish, they must be given more study by botanists as well as by growers. It is necessary that their identities be worked out more satisfactorily than at present and that accurate botanical names become available for common usage. All firms dealing with aquatics and the world's aquarists will be grateful when this desirable state of affairs materializes.

Cecil E. Houdyshel

Few bulb and plant dealers are as well known to their customers as is Cecil Houdyshel of LaVerne, California. Twice each year since 1925 as many as 30,000 Amaryllis and Saintpaulia enthusiasts have received a letter from him in the first page or two of his spring and fall catalogues, acquainting them with his personal life as well as his business.

In the late 1920's they learned that he cured his ulcers with goat's milk. They shared his bereavement in 1944 and 1945 when his mother and daughter died within six months of each other. They read of his victory garden during the war, and realized the depth of his patriotism and his Christian faith. They have also read his letter-editorials about things he considers important -- education, community cooperation, the power of labor unions, the value of hobbies, and family unity. And it was through his catalogue that Mr. Houdyshel acquainted his customers with the pronunciation of his Dutch name: to illustrate the correct pronunciation, "Howdy-shell," he devised the trademark of a scallop-shell with clasped hands across it which appears on each catalogue. Once he tried to explain this to a young Japanese who spoke little English. Mr. Houdyshel shook hands with him and said, "Howdy." The man looked puzzled but then smiled as he returned the hand-

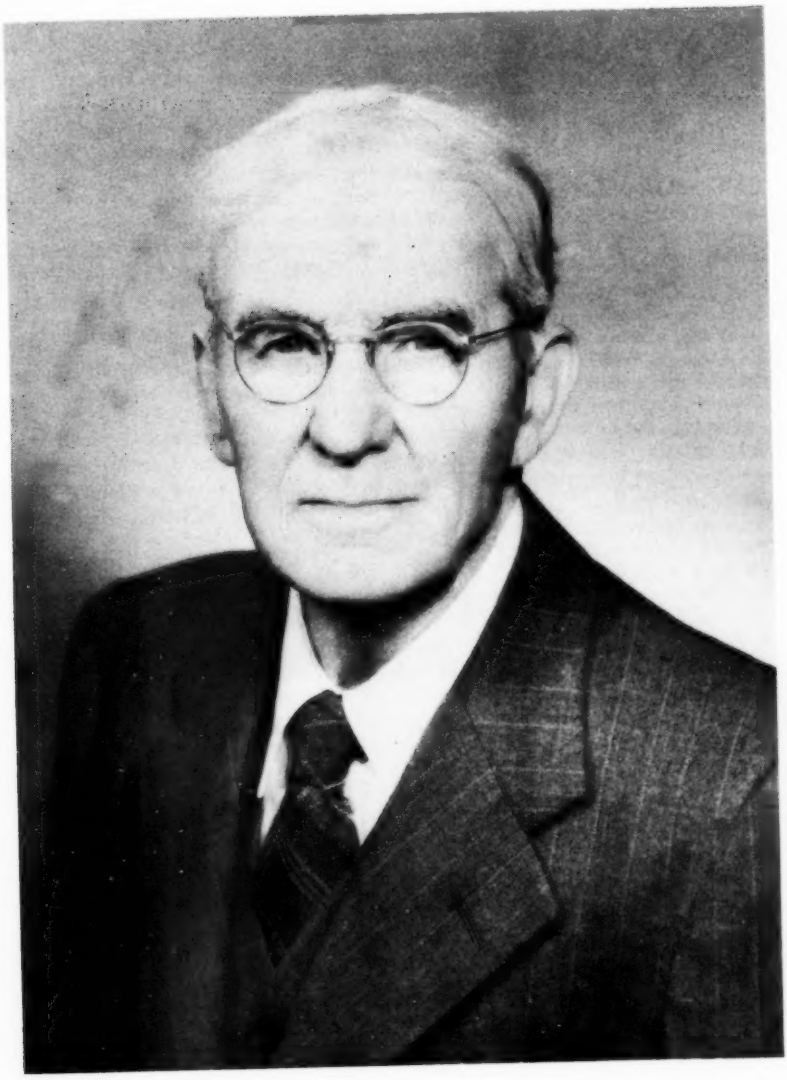

Fig. 22. Cecil E. Houdyshel

shake and replied, "Oh, Mr. Pleased-to-meet-you-shell!" Mr. Houdyshel never tried to correct him.

Most of all, through these letters his customers know of his deep love for flowers, especially those of the amaryllis family, and of his thirty-three years of work in cultivating and disseminating beauty through breeding and selling bulbous and other plants.

His profession as plantsman developed naturally, if slowly, from his boyhood love of plants. Mr. Houdyshel was born in Iowa in 1873 to parents whose Dutch ancestors had emigrated to America in the 1740's. He remembers vividly his maternal grandfather's Iowa farm garden of the 1880's. Its beauty, he is certain, increased his appreciation of plants.

Of his mother's influence, he tells us: "When I was a small boy of about eleven years we were living at Lyons, Kansas. Mother, as always, had a garden. I admired the bright colors of Phlox Dummondii and asked for the privilege of taking care of them. Thus I became the family gardener." He adds, "An Amaryllis Johnsonii later made a florist of me. Since first possessing the bulb in 1897 I have become a constant collector."

As a young man he lived in Iowa, Kansas, and Nebraska, roving about as his father's work changed from farmer on Iowa corn land to merchant and finally to real estate broker in California. Perhaps because of this constant traveling he was an inattentive student during his high school years. However, his attitude changed when he entered Campbell College in Kansas, and he worked his way through with a variety of jobs, including coal mining. The study of natural science particularly absorbed him. He graduated with the class of 1896 with a Bachelor of Science degree, and after further study received his Master of Arts degree.

Still thirsting for knowledge, he attended Kansas University, continuing his science studies and preparing for a teaching career. In 1903, when he was 29, he graduated with a Bachelor of Arts degree. It was while a student there that he was further influenced towards a career as a plantsman. His professor, Samuel W. Williston, noted American geologist and biologist of the turn of the century, gave him bulbs of Crinum, a genus of the amaryllis family. Mr. Houdyshel's later work in cross-breeding its members stems from this gift. Of all the amaryllis family, he considered himself a specialist only in this group.

To Mr. Houdyshel, who started teaching science at a Pomona, California, high school in 1905, that state became "the land of perpetual flowers and of Luther Burbank." Mr. Burbank became both his advisor and friend, and did the most to convince the younger man to leave the schoolroom and become a plantsman. Even while

Mr. Houdyshel was principal of two Nevada schools during 1910 and 1912, he often returned to California to see Burbank. "I was drawn there," he recalls, "by his gracious personality and wonderful collection of hybrid amaryllis and other plants." Burbank was certain that originating amaryllis hybrids would not bring profit in the coming decade and suggested that he work with gladiolus. Following this advice, Mr. Houdyshel purchased seeds and bulbs from Burbank which, together with material imported from the Aigberth Nurseries, England, provided the foundation stock for his first hybridizing work.

Mr. Houdyshel attempted particularly to produce an everblooming type of gladiolus. His efforts were rewarded in 1915 when a hybrid from one of his crosses resulted in a plant whose stems produced new flowering side-stems, continuing to do so throughout the summer. He named it 'Los Angeles' (one-fourth G. primulinus and three-fourths G. gandavensis), the "cut-and-come-again-gladiolus." Mr. Houdyshel tells us that today it is used mostly for landscape planting in the southern states.

When he introduced 'Los Angeles' in 1925 it was immediately successful as a cut flower and for planting. With its acceptance he saw his hopes of spending all his time with his beloved plants coming to fruition. A year earlier he had founded the firm of Cecil Houdyshel in La Verne, his California home, but not until 1927 when orders for 'Los Angeles' reached $1,000 in one month did he resign from his teaching position at Polytechnic High School in Los Angeles. One can understand this caution before embarking on a new profession, for he was then 52 and had a wife and two children to support.

Other gladiolus introductions followed 'Los Angeles', but these have been replaced by the many improved clones introduced by others over the years. His most recent named introduction in this genus was 'Mauve'. In the late 1930's he attempted to do for iris what his 'Los Angeles' had done for the gladiolus. He was not so successful with them, although he did introduce a number of hybrids named for his family and friends.

Mr. Houdyshel also undertook to improve clivias and crinums in the amaryllis family. His success with the latter is reflected particularly in his beautiful Crinum 'Cecil Houdyshel', popular in southern gardens. Crinum 'Virginia Lee' ('Cecil Houdyshel' × 'J. C. Harvey') and C. 'Gordon Wayne' (seedling of 'Virginia Lee'), named for his grandchildren, are two other favorites of nearly twenty years' standing. They will again be listed in the Houdyshel catalogue next year, having been withdrawn to replenish the stock.

The introduction of rare and unusual species of plants of the amaryllis and other families has been another of Mr. Houdyshel's

interests. Other plants that appear on his current list, several of which he has introduced to cultivation in the United States, include:

| | |
|---|---|
| Crinum latifolium | Hippeastrum candidum (Amaryllis immaculata) |
| C. Moorei 'Rosea' | H. organense (A. organensis) |
| C. pedunculatum | H. psittacinum (A. psittacina) |
| C. podophyllum | H. vittatum (A. vittata) |
| Haemanthus albiflos 'Brachyphyllus' | Lycoris incarnata |
| H. carneus | L. Sprengeri |
| H. natalensis | Moraea isopetala |
| H. puniceus | M. polystachya |

In 1938 Mr. Houdyshel became the William Herbert Medalist of the American Amaryllis Society (now the American Plant Life Society) of which he had been a founding member in 1934. It was given him in recognition of his contributions as "an educator, plant breeder, and professional plantsman." In the Society's yearbook, Herbertia (vol. 5, pp. 70-75 [1938]), for that year, he recounted his work with amaryllids in a delightfully written autobiographical sketch. The last paragraph of that sketch characterized him particularly well:

> "To live and work until 100 is my ambition. My physician, a wise, able and noted scientist, aged 80, says that it is possible...At least I am still working, loving, living, and happy withal. I may add - so is my mother."

On October 5, 1957, Mr. Houdyshel will celebrate his eighty-fourth birthday. A few months ago he penned this comment: "I am rather certain that at 83 I have slowed down," but he added, "It seems to me that to avoid frustration one must in old age continue to work....Having been a science teacher so long, I must experiment a little on finding the best culture for new plants and I must make crosses also as once in 1,000 times something new and better may result." In addition to these pursuits he prepares his catalogues twice a year and answers a considerable volume of mail from his customers throughout the world.

During its thirty-three years of activity, the firm of Cecil Houdyshel has undergone a number of changes, both in size and in material offered to the wholesale and retail trade. The establishment has grown to six acres, five greenhouses, and two large lath houses. The greenhouses are for some of the clivias and other amaryllids, for the achimenes, the orchids, the caladiums, and the African-violets. In addition to Mr. Houdyshel and his wife, there are now five men and an office staff on the payroll.

The first plant lists offered only amaryllids and gladioli, both domestic and foreign, of his own and others' origination. As his

interests grew and as plant lovers became more aware of the greater variety of plants available, he added these to his list: as many as fifty species of cacti; tulips; members of the iris, lily, and orchid families, as well as of the Araceae, Ranunculaceae, and Oxalidaceae. All except the cacti are listed in his current catalogue.

While at one time he grew as many as fifty species of orchids, his current list concentrates mainly on the genus Cattleya. Since 1942 he has offered the graceful bromeliads of the genus Billbergia, and begonias were added in 1948. African-violets became a specialty that same year and today are the largest sales item. He is currently offering 334 fancy-named varieties, including several of Mrs. Houdyshel's origination. In 1951 'Sherry Girl' was introduced, named for his great-granddaughter.

African-violets have caused a greater proportion of city dwellers to purchase plants from him than previously, for they are particularly suited to apartment conditions. All during the year visitors travel twenty-seven miles eastward from Los Angeles to visit the Houdyshel African-violet greenhouses and purchase plants. They come sometimes from more distant places: Canada, Alaska, England, Palestine, Arabia, as well as the farther States. The amaryllis family now ranks second in sales but remains as close as ever to Mr. Houdyshel's heart.

In addition to this local retail and national mail-order trade, a wholesale trade was developed, particularly on the West Coast, but it is of minor importance today. Currently, seeds and plants are grown for other commercial suppliers side by side with material for his own retail market. Ninety percent of the plants and bulbs he offers are grown on his acreage; the rest are imported from Europe or obtained domestically.

Mr. Houdyshel's catalogue serves his customers as a handbook on culture as well as a price-list of bulbs and plants. He is more interested that they succeed in growing them than in the number they buy. His time-tested procedures are passed on and techniques are given to assist those who wish to experiment with hybridizing.

The Houdyshels have developed this trade together, endeavoring to share their enjoyment in raising plants and bulbs with enthusiasts throughout the United States and on several continents. In addition to managing the two Saintpaulia greenhouses, Mrs. Houdyshel is in charge of local sales; helps with the bookkeeping; gives lectures about plants and their culture; and displays Houdyshel plants at California flower shows. Both have the kindliness and warm personality that is captured so well in the photograph of Mr. Houdyshel that is reproduced here.

## Frank H. Michaud

New World plant lovers will always be indebted to European plantsmen for the variety, beauty, and excellence of many plants they grow today. They are indebted, too, to individuals among them who have left their native land, adopted North America as their home, and have provided from Old World gardens plant material they found unavailable here. Mr. Frank H. Michaud is one of these men.

When he was twenty-five years old, Mr. Michaud founded a nursery at Chelles, just outside Paris, France, under one of his Christian names, Urban. He specialized in "plantes en arrachis" (rooted cuttings), particularly of Pelargonium, carefully tended under greenhouse protection. His earlier training in French and English nurseries prepared him for this vocation, which followed naturally upon a love of plants encouraged by his father, the superintendent of a French estate. Born in 1879 at Fontenay-le-Comte, Vendée, he attended the École Supérieure in that city and from his youth had his own garden to care for.

Six years after he started business, the flood waters of the Marne destroyed it all. Leaving his two children behind until he could afford to send for them, Mr. Michaud and his wife crossed the ocean and the North American continent to re-establish his nursery in British Columbia. He started out with little more than certain intangible assets: a love of plants, especially those of the rock garden; the skill of a trained plantsman; and an enthusiasm and personality that won the confidence of Canadian and American plant lovers who bought the seeds he soon offered for sale.

Mr. Michaud's Alpenglow Gardens at New Westminster, a few miles from Vancouver, were very different from his former nursery. At first he raised sweet peas on a five-acre tract wrested from virgin forest. The climate and soil proved ideally suited to seed production, and Vancouver's gardeners must have liked sweet peas, for in a few years he was financially able to send his wife back to France to bring the children. As his nursery developed, he had the pleasure of watching his son and daughter grow up with an enthusiasm for plants equal to his own. Today, Roger and Christiane are active partners assisting in the management and growing of Michaud and Company plants.

Mr. Michaud issued his first list of seeds in 1923. By 1926 his offerings had become more general - annuals, perennials, and vegetable seeds were the primary stock. Succulents and bulbous plants were also offered. In 1930 a short list of alpines and rock garden plants was added to his catalogue, a portent of his specialization in them today.

Fig. 23. Frank H. Michaud

From the Swiss Alps Mr. Michaud imported species and hybrids of the Auricula section of the genus Primula as well as other rare primroses and alpines. In 1937, after reading an article about them, he became particularly interested in the English show auriculas. Although the plants were difficult to import from England, often dying in transit or shortly after arrival, and did not grow successfully in recommended composts, he persisted in this expensive attempt to acquire a complete line of these plants. The Michaud children were not at first so enthusiastic as their father about such costly plants, but have become thoroughly convinced of their worth as garden material. It was the Michaud firm that first made the better varieties of English show and alpine auriculas, both the older kinds and the latest novelties, available to gardeners here.

The subtitle of the price list Mr. Michaud prepares each year suggests the variety of material he currently offers: "Hardy Alpines, Perennials, and Dwarf Shrubs for the Rock Garden." There are 182 genera listed under these groupings in the catalogue for 1956, some with only one or two species representing them and others with name after name of species and varieties. About a third of his stock for these offerings is imported from European commercial firms, botanic gardens, and private collectors. The longest listings reflect special interests of the Michaud family.

Christiane is particularly enthusiastic about the encrusted and Kabschia saxifrages, the haberleas, and dianthus, which she tends with loving care. These groups are both extensive and of distinctive kinds, considering that they are not a specialty with the firm. The same is true of the mossy group of saxifrages that is offered. Her brother Roger finds special pleasure in propagating cultivars of dwarf conifers which are becoming an increasingly important item for the firm, such as Abies balsamea nana, Chamaecyparis obtusa vars. coralliformis and gracilis, and Juniperus communis compressa. True dwarfs are not commonly offered by many firms, but those of Michaud are all on their own roots and some gain only a quarter of an inch each year. He is also in charge of the heathers, species of Calluna and Erica, and of the brooms, Genista and Cytisus. These groups, too, form extensive lists for a firm offering so many kinds of rock garden plants.

Among other rare plants included in the Michaud lists for the rockery are:

Carmichaelia Enysii (Leguminosae)
Celmisia gracilenta (Compositae)
Chamaecyparis pisifera nana (Cupressaceae)
Conandron ramondioides (Gesneriaceae)
Cortusa Matthioli (Primulaceae)

Cyananthus integer (Campanulaceae)
Empetrum nigrum hermaphroditum (Empetraceae)
Epigaea asiatica (Ericaceae)
Erinacea pungens (Leguminosae)
Erythraea diffusa (Gentianaceae)
Fauria Crista-galli (Gentianaceae)
Gentiana × hascombensis (Gentianaceae)
Hebe Astonii (Scrophulariaceae)
H. Hectori
Helichrysum scorpioides (Compositae)
Heloniopsis breviscapa (Liliaceae)
Jeffersonia dubia (Berberidaceae)
Juncus effusus spiralis (Juncaceae)
Kalmiopsis Leachiana (Ericaceae)
Leucothoe Keiskii (Ericaceae)
Lewisia Cotyledon (Portulacaceae)
L. Finchii
L. Heckneri
Loiseleuria procumbens (Ericaceae)
Menziesia azorica (Ericaceae)
Mitraria coccinea (Gesneriaceae)
Oreocharis primuloides (Gesneriaceae)
Pentapterygium serpens (Ericaceae)
Podophyllum Emodii (Berberidaceae)
Sanguinaria canadensis flore-pleno (= multiplex) (Papaveraceae)
Sibiraea croatica (Rosaceae)
Solidago brachystachys (Compositae)
Soldanella alpina (Primulaceae)
Stylidium graminifolium (Stylidiaceae)
Talinum okanoganense (Portulacaceae)
Veronica Guthrieana (Scrophulariaceae)
Viola arenaria rosea (Violaceae)

It is with the show auriculas that Mr. Michaud's skill as a plantsman is best seen. Except in the Pacific Northwest, where the plants grow best on this continent, they are greenhouse plants requiring careful attention lest they receive too much water in spring, too much dry heat in summer, and too much cold in winter. In most parts of this country their successful culture is a hallmark of the master plantsman.

Mr. Michaud has made many controlled crosses in the last few years. Some of the progeny hold promise for future listing. Several of his yellow-flowered self-pollinated plants have excellent quality, rating high under the point system for judging show auriculas. Because of importation restrictions, English show auriculas are now impossible to obtain from Great Britain and Mr. Michaud's plants are serving as parent stock for most of the kinds of British origination that are grown in North America.

Visitors to Alpenglow Gardens enjoy a wonderful treat in April and May when the auriculas are blossoming in the greenhouses. Those who come seldom leave empty-handed, for Mr. Michaud believes that as many persons as possible should become acquainted with auriculas. He is careful, however, to retain enough of each kind for others to purchase. Often he inquires about the prospective buyer's interest in plants, for he is concerned that they go only to those who will appreciate and properly care for them. He willingly provides instructions for culture to help ensure success.

Mr. Michaud tells us that many of the women among his customers in the United States began selling a few of their surplus plants grown from his stock and are now in business for themselves. This pleases him, for he has always fostered interest in primroses throughout North America and is gratified that the plants are available to more persons through these new enterprises.

He finds that interest in all better and rarer plants increases every year, particularly in the dwarf conifers. This is borne out by the fact that the dollar-volume of his business is ten times greater than in the early 1930's, and that he carries more than seven times as many kinds of plants as he did at that time - some 1500 - to meet this growing interest.

The five-acre nursery where these plants are propagated is divided by a ravine crossed by a wooden bridge that leads to cultivated fields of alpine plants. Cold frames and greenhouses surround the Michaud home on the nearer side of the bridge. In keeping with the material he offers, Mr. Michaud's hobby and display garden is a rockery with some of the rarer and more interesting of the perennials he offers.

No account of this plantsman would be complete without mention of the warm personality and interest in people that has earned him friendships with plant lovers across the continent. His interests also include stamp collecting, color photography, and studying the literature of the plants he loves. His library includes some 175 horticultural and botanical volumes.

So important has Mr. Michaud's contribution seemed to rock garden and primula enthusiasts in Canada and the United States that in 1955 the American Primrose Society awarded him the Bamford Trophy, in recognition of his efforts in furthering the culture of the auricula in America and Canada during 1955.

# The Genus Cortusa

George H. M. Lawrence

The genus Cortusa is a member of the primula family - this, because the petals are fused basally to form a short corolla-tube, and because the ovary has no partitions within, its many ovules being borne on a thickened central column. This type of ovule arrangement in a unilocular ovary (one without partitions) is called free-central placentation. It is characteristic of members of the primula and the pink families. Cortusa may be separated from the related genera Primula and Androsace by its stamens' being attached to the base of the corolla and by the apiculate tips of its anthers.

Cortusa was named by Matthiolus in honor of his friend, a Director of the Botanic Garden of Padua (Italy), J. A. Cortusi (1513-1593). Linnæus adopted the name in his "Genera Plantarum" in 1737.

As many as seven or eight species have been claimed for this genus, but when these are studied together the characters by which they are alleged to differ lose their distinctiveness. Probably there are only two species: Cortusa Matthioli, with purple corollas, and C. Semenovii, with yellow corollas. The latter species, a native of Turkestan, is not known to have been grown in gardens of western Europe or America.

Cortusa Matthioli was named by Linnæus in 1753, in honor of the Italian physician and writer on plants, Pietro Mattioli (Matthiolus, when latinized) who lived from 1500 to 1577. The species is a woodland plant of mountainsides, from central Europe, across Asia, to Japan. It is very variable and several of the varieties have been introduced to gardens - often as separate species.

Three variants of the species are current in the American trade:
(1) The typical form, with leaves glabrous to somewhat villous, orbicular to kidney-shaped in outline with rounded apex, and with 7-9 lobes whose margins are crenate-dentate (the teeth blunt or obtuse), the calyx-lobes triangular;
(2) forma[1] pekinensis Richter, a native of China, with leaves densely hirsute, deeply incised-lobed and each of the 7-9 lobes pinnately divided, the calyx-lobes very narrow;

[1] Although these variants are commonly offered in the trade as varieties (e.g., var. pekinensis), they have been treated botanically as formæ (i.e., forms) by Knuth, in his monograph of the genus Cortusa in Engler's "Das Pflanzenreich" (IV, 237) pp. 220-222.

(3) forma pubens (Schott, Nyman, Kotschy) Schur (C. pubens Schott, Nyman, Kotschy), with leaves deeply lobed, and the lobes broad, with coarse teeth.

European sources currently offer other variants (sometimes listing them as species), such as:

cv. 'Alba', a white-flowered cultivar;

forma Brotheri (Pax) Knuth (C. Brotheri Pax ex Lipsky), with orbicular leaves having rounded lobes, and flowers larger than in most variants;

cv. 'Grandiflora' (var. grandiflora Regel), which may be only a large-flowered selection of var. villoso-hirsuta;

var. hirsuta, believed to be a synonym of forma villoso-hirsuta;

forma villoso-hirsuta Schur (C. hirsuta Borbas), with leaves glabrate to somewhat hirsute, deeply incisedly lobed and the lobes also deeply incisedly toothed, the calyx-teeth triangular.

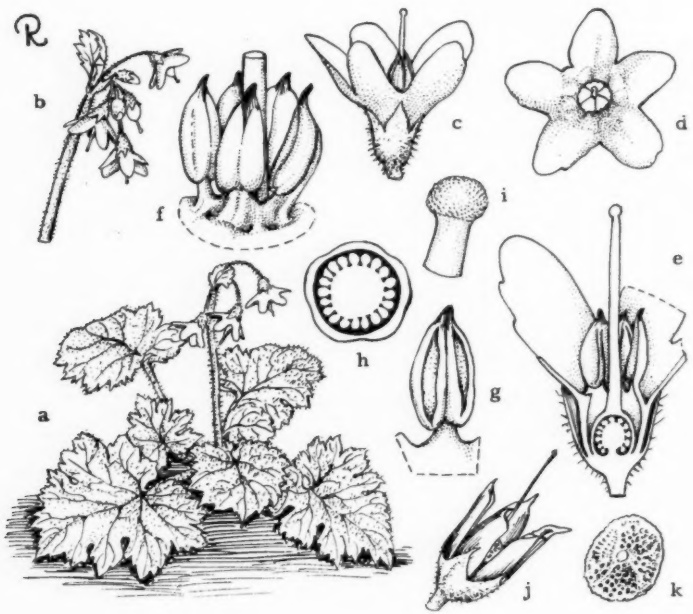


Fig. 24. Cortusa Matthioli: a, habit; b, inflorescence x 4/5; c, flower, side view x 2 1/2; d, flower, face view x 2 1/2; e, flower, vertical section x 5; f, stamens x 10; g, single stamen, ventral (inner) face x 10; h, cross-section of ovary x 10; i, tip of style and stigma x 20; j, capsule (open) x 3; k, seed x 10.

A variant grown in Europe as C. transylvanica has not been seen by me nor does the name appear in available literature. A contemporary Russian botanist, A. Losinsky, has described several western Asiatic taxa as new species. None of these is yet known to be in cultivation. In the new "Flora URSS," Cortusa is treated as composed of 7 species for the geographical area covered, a view that may reflect a liberal species concept.

Plants of the genus Cortusa are of easy culture, propagated readily by division or by seed if the latter is sown as soon as ripe. Their hardiness depends more on being covered either by a deep snow, or by a heavy mulch of leaves, than by air temperature alone. Without mulch, they may not survive extended temperatures of 10° F (-12° C). They flower in May and June, and require partial shade.

## BOOK REVIEW - "TREES OF CENTRAL AFRICA"

The National Publications Trust of Rhodesia and Nyasaland has recently (1956) made possible the publication of a beautiful volume which is sure to interest horticulturists of southern Florida and California who are on the lookout for "new" exotic ornamental trees for their climates. "Trees of Central Africa" consists of reproductions of water color paintings by Olive H. Coates Palgrave, depicting foliage, flowers, and fruits of 110 trees of Rhodesia and Nyasaland; these are accompanied by excellent full-page habit photographs of the trees by Mrs. Palgrave's sons Deric and Paul, and by a text by a third son, Keith. The text includes botanically accurate but readable brief descriptions of each tree and its parts, scientific, common, and native names, distribution information, and notes on practical, medicinal, magical, and more sinister uses of each. An appendix includes explanations of terms used in the descriptions. The 466 pages are slightly more than 9 x 12 inches in size. The price in this country is about 12 dollars.

The geographical area accounted for is, strictly speaking, far from "central Africa," and actually somewhat east-of-center of that portion of Africa lying south of the Equator. A random sampling of included species, compared with the Hortorium's file of plant material sources, shows that only about two-fifths of them have ever been available in the trade in America, and sources for even those have often been a single enterprising plantsman. "Trees of Central Africa" reveals how many desirable ornamental trees have yet to reach our shores - and our gardens.

W.J.D.

## A SOURCE OF RARE TROPICAL PLANTS

Few persons outside of Florida may be aware of the plant introduction and distribution activities of the Florida Federation of Garden Clubs. In 1952 it released its first list of plants - not seeds - ready for free distribution to members of the Federation. Since then, one or more lists have been published annually.

The plants whose names appear in the lists are grown from seeds brought from all continents and these plants are distributed under the names under which they are received unless it is known that a particular name is clearly a synonym of a correct name. A brief description of each plant listed is given, together with available information on presumed hardiness, soil preference, and uses. Considerable care is used to select for the membership only those plants that are believed to be new to most Florida gardens or that are of special horticultural merit. Certainly the lists provide little or no competition with commercial suppliers.

It is interesting to note from the list for March 1957 that ten species are offered for what is believed to be the first time in this country. The names of these new introductions are:

Antidesma Dallaychianum (Euphorbiaceae)
Flacourtia Rukam (Flacourtiaceae)
Anthurium longilaminatum (Araceae)
Euphorbia enocephala (Euphorbiaceae)
Uvaria lancifolia (Annonaceae)
Begonia Caffra (Begoniaceae)
Callicarpa × Schirasawana (Verbenaceae)
Chlorophytum orchidastrum (Liliaceae)
Acacia spadicigera (Leguminosae)

The plants for this distribution are grown at Fort Lauderdale under the able supervision of Mr. D. J. McSwiney. For the most part, they are sent out as young plants. The program is under the direction of Mrs. William C. Knox, 649 Isle of Palms, Fort Lauderdale, Florida.

Individuals interested in receiving these lists and becoming eligible to obtain the plants offered are invited to request information from Mrs. Knox about becoming a member-at-large of the Federation. This request should be accompanied by the annual dues assessment of five dollars. Established horticultural institutions may obtain the lists for library record without becoming members.

G.H.M.L.

# The Cultivated Taccas

Wyndham Hayward
Winter Park
Florida

The successful introduction (from Malaya) and increasing popularity of Tacca Chantrieri André in the eastern United States, Hawaii, Puerto Rico, and elsewhere, as an ornamental plant, have revived interest in this curious and remarkable genus, one of two in the equally remarkable and utterly fascinating family of the Taccaceae.

The taccas are at present cultivated only by a few natives or aborigines, in Africa, the Far East, and the Pacific islands, mainly for food or for supposed medicinal powers, and, at the other end of the social scale, by a few rare plant fanciers and connoisseurs of choice and distinctive pot plant and garden subjects.

The flowers are the most striking feature of the taccas, in the highly attractive species Tacca Chantrieri and T. cristata being purple-black or maroon, with showy expanded bracts and numerous long, trailing, filamentous bracts which give rise to the names of "Cat's Whiskers Plant," in America, and "Catfish Beard Plant" in Malaya. The widely spreading dark bracts of T. Chantrieri give reason for the other popular English names of "Devil Plant" and "Bat Plant." It certainly has a sinister, macabre look, when in full bloom, as André pointed out in 1901, in his original account, where he observed that it belongs definitely to that group of "fleurs fatales" like the mandrake and the belladonna!

Twenty-seven species of Tacca were recognized by Dr. W. Limpricht, the latest monographer of the Taccaceae in "Das Pflanzenreich" in 1928, and three or four species have been described as new since then. Of these, only Tacca Chantrieri André, T. Leontopetaloides (Linnaeus) O. Kuntze, T. minor Ridley, T. cristata Jack, and T. involucrata Schumacher and Thonning may be said to be in cultivation today to any extent in America.

The Royal Botanic Gardens at Kew reported last year that T. Chantrieri is the only species of the genus now in cultivation there. The New York Botanical Garden likewise has it in cultivation and has distributed it widely in America. The plant has reached the West Indies, and is pictured and described by Harold F. Winters,

U. S. D. A. horticulturist, in a recent bulletin there. Winters reports that the Puerto Rican plants came originally from the New York Botanical Garden. It is possible that most of the plants of this species now found in the United States (one grower in Florida is now producing Tacca Chantrieri by the hundreds) came from these introductions by the Botanical Garden, or from seed received from India and Malaya.

This comparatively new species was first described by the eminent French botanist and plant explorer, Edmond André, in the Revue Horticole for 1901, with high recommendation for its merit as an ornamental plant. It has strongly veined, almost pleated, glossy, dark-green leaves of an ovate-lanceolate shape and coriaceous texture, on long petioles. The petioles and leaf reach as much as a meter in length in optimum culture. The leaves (and the scape, which is axillary) rise from the rhizome or tuberous root, which gradually elongates with age, but very slowly.

The flower of Tacca Chantrieri is shaped somewhat like a drooping maroon-colored blueberry, tapering to a pedicel about 3 cm. long or longer. There may be five to seven or more flowers, subtended by the spectacular wide involucral bracts, as shown in the accompanying photograph of a three-year-old plant growing in the summer of 1956 at Lakemont Gardens, Winter Park. The picture also shows plainly the long, sterile, filiform floral bracts, which hang down with the flowers in the umbel.

The pedicels elongate and the ovary swells when fertilization is completed. The writer and other growers find seed is usually self-set, no artificial pollination being necessary. The fruit of T. Chantrieri grows slowly to a three-sided fleshy berry in three or four months, as large as a pullet's egg, shiny-black like patent leather, and when ripe the fruit cracks open to show the curious ribbed seeds, in a mass of greenish pulp. When separated from the pulp and washed, they are ready to plant. Leaf mold and sandy loam, or a compost made of half sharp builder's sand and half sifted Florida peat, suits them well as a germinating medium. They may take several weeks to germinate, and should be kept warm, moist, and lightly shaded, protected from drenching rains and hot sunshine. Tacca Chantrieri is definitely a shade plant, requiring at least half-shade conditions. Growth is rapid in the warm season, but the plant takes a long rest during the cold months, meanwhile retaining its handsome crown of foliage and the seed-filled berries which continue to ripen during that period.

The writer has grown T. Chantrieri, T. cristata, and T. minor in the past two years from home-grown seed and from seed sent by the Singapore Botanic Gardens. Seedlings grew vigorously and reached four- to six-inch pot size in a single season with good culture. Two or three seasons' growth should be sufficient to pro-

Fig. 25. Tacca Chantrieri.

duce strong blooming plants. The seedlings of T. cristata, however, have proved, like plants of T. Leontopetaloides, to be ultratropical, and were killed outside in central Florida by sharp frost in December which scarcely burned the leaf tips of T. Chantrieri and T. minor.

The writer first saw Tacca Chantrieri in bloom at a flower display in Winter Park several years ago where specimens were exhibited by E. W. Ensign, rare-plant fancier of Orlando, Florida, who said he had raised them from seed. The flowers were borne on their sturdy scapes well above the leaves, the truly fabulous spreading "batwings" framing the pendent blooms just as in the accompanying photograph, and in André's original illustration. Although it was a begonia show, the taccas in flower fascinated all spectators.

Plants of Tacca Chantrieri are sometimes found in botanical gardens and offered in dealers' catalogues under the names T. laevis, T. cristata, etc., but, in all cases in the United States where plants have been purchased under these other names, they have turned out to be T. Chantrieri. Actually, T. cristata and T. laevis are valid names of other species described in the nineteenth century.

Tacca cristata Jack is figured in Curtis' Botanical Magazine (1851), plate 4589, with text by W. J. Hooker, and in Ridley's "Flora of the Malay Peninsula," volume 4, page 310 (1924), the second plate evidently based on the former. Limpricht states that this plate (No. 4589) is actually T. aspera Roxburgh. There is considerable confusion about the various closely allied species of Tacca, which Limpricht does little to remedy in his monograph. Actually, there is a dearth of recent careful systematic and taxonomic research in the field, especially by English or American botanists.

Mr. J. R. Sealy, of the Kew Herbarium, reports in a recent letter that "Plate 4589, Botanical Magazine, agrees better with T. cristata Jack than with T. aspera Roxburgh, and may well take the former name." Burkill, also in a recent letter, expressed the belief that Limpricht "was working on unreal differences" in the character of the bracts when he did his monograph. As a result, he "could put a different name on almost every sheet" of the Kew Herbarium taccas when he examined them during his studies. Dr. Merrill has also commented, "I find Limpricht's recent monographic treatment unsatisfactory."

Cytological studies in the course of time may help to solve some of the confusing problems. Only one chromosome report has been made for Tacca: in T. involucrata, n = 15, according to Baldwin and Speese. Dr. Flory hopes to have one for the Tahitian T. Leontopetaloides shortly.

Tacca Leontopetaloides (Linnaeus) O. Kuntze (synonym: T. pinnatifida J. & G. Forster) is one of the world's most celebrated plants, or was, a hundred years ago, with many articles and accounts published on it during the nineteenth century, but it has been largely forgotten in the last fifty years. Never especially known as an ornamental, although highly striking and effective in character of growth and foliage, Tacca Leontopetaloides was noted a century ago as the source of a well-known starchy food for invalids, called "South Sea Arrowroot," "Tahiti Arrowroot," or "Fiji Arrowroot."

Tacca Leontopetaloides, at least the Hawaiian form, was then an important crop in the Hawaiian Islands as well as on Tahiti and Fiji, exports of the flour having exceeded 10,000 pounds from Honolulu in a number of years before and after 1850, according to Seemann, who is a major source of information about the plant in his time. Dr. Otto Degener, a leading Hawaiian botanist, reports today, however, that the plant has virtually disappeared from cultivation and is scarce even as a wild or naturalized plant in the Islands. It is Dr. Degener's opinion that the plant was brought to Hawaii from Tahiti by the Polynesians some 2,000 years ago and that the Hawaiian form has developed separately since then.

Limpricht gave the Hawaiian form, previously known as var. hawaiiensis, specific rank in 1928. Dr. E. D. Merrill considered it merely a form of T. Leontopetaloides, in 1945, and Sir Edward Salisbury in 1956 wrote that "several sheets in the Kew Herbarium have been identified as T. hawaiiensis, but these appear to fall within the range of variation of T. Leontopetaloides." It is apparently a smaller form of the species.

Recently, through the kindness of a South Seas florist, P. L. Criblet, of Papeete, Tahiti, the writer was able to obtain tubers of Tacca Leontopetaloides, grow them one season, and study their habit and culture. The tubers of T. Leontopetaloides as received from Tahiti were 3 to 8 cm. in diameter, flattish, some of them already sprouting from an "eye" at the top. The color was dirty brownish and the sound tubers were hard and firm. Spare tubers were distributed to the Bailey Hortorium, the Arnold Arboretum, and the University of Virginia's Blandy Experimental Farm at Boyce, Virginia, for cytological research under Dr. Walter S. Flory, and to Dr. Walter L. Lauter, University of Florida College of Pharmacy, for study of the bitter principle in the tubers, which may be toxic.

The writer grew several tubers during the summer and fall of 1956 at Winter Park, Florida, and observed that they develop thriftily in a sandy, fertile compost, make a horticulturally ornamental subject for a few weeks, especially during the long blooming period, but soon thereafter become weedy and coarse-looking, and in the later part of their growing period are not attractive. They

are evidently ultratropical as sharp frosts in late November and December killed the plants to the ground in the lath house, and shocked them so that even the tubers in the pots were lost. This susceptibility to cold damage may explain why the plant has failed to become established in the United States, either in Northern greenhouses or in the lower South. Growth is seasonal as in the white potato (Solanum tuberosum).

I. H. Burkill, formerly director of the Singapore Botanic Gardens, mentions three species of Tacca in his "Dictionary of the Economic Products of the Malay Peninsula" as having some importance in that line in Malaya: T. cristata, T. palmata, and T. pinnatifida (= T. Leontopetaloides). Of T. cristata he wrote, "common throughout the Malay peninsula, and sometimes brought into gardens;" of T. palmata he says, "found throughout much of Western Malaysia, but only on the East Coast of the Malay peninsula...the tubers are medicinal...scrapings are applied to snake bites...it may be useful for healing wounds...the pulped stem is applied to the umbilicus for stomach-ache."

Burkill says of T. Leontopetaloides, the South Sea Arrowroot plant, "It has tubers which are very bitter when raw but by suitable preparation can be made edible. Sometimes they reach a weight of about two pounds. Formerly this plant was cultivated in Siam... it is cultivated up and down the Pacific, Eastern Asia and East Africa, but has never had more than local importance." He calls it rare in the Malay peninsula, and quotes Koorders, a Dutch author, as saying the tubers are boiled or roasted for food in the Karimon-Java Islands. "Tahiti Arrowroot is a good food for invalids," he adds, and remarks that the stems are used for braiding into hats.

Possibly this plant under modern, intensive agriculture would still be useful for production of starch, similar to arrowroot and sago flour. Monsieur Criblet reports from Tahiti that during World War II, as an added food supply, Tacca Leontopetaloides was collected by natives on the low-lying islands of the Tuamotu Group, northeast of Tahiti, "where they are growing wild in very sandy coral soil near the sea shore, reproducing by seeds and growing in the full sun."

Thomas Nuttall, the Anglo-American botanist and plant explorer of the early nineteenth century, described the Hawaiian form of T. Leontopetaloides as Tacca oceanica after his trip to the Hawaiian Islands. His plate is excellent, and his name would certainly have priority over Limpricht's T. hawaiiensis if the plant were to be maintained as a separate species. In the Nuttall article, the tacca flour is called "Sandwich Island Arrow Root," which "is a rare article in the American market. It has, however, been introduced; it is stated that a large quantity was some years since brought to the United States." A Dr. Ruschenberger "of the United

Fig. 26. Tacca Leontopetaloides, from a two-inch tuber, blooming in September, 1956.

States Navy" is quoted as saying that he "preferred it as nutriment for the sick on board the 'Peacock' to the ordinary arrowroot. It is sold in the islands at about six cents per pound."

Probably the best reasonably modern account of Tacca Leontopetaloides in English occurs under plates 7299 and 7300 of Curtis' Botanical Magazine, June 1, 1893, although the illustration of the umbel in bloom shows an immature specimen, and this is better depicted in Nuttall's plate. The text is by the distinguished Joseph Dalton Hooker, and he points out that there are two main types of T. Leontopetaloides, the South Seas form of Forster and the form described and illustrated by Rumphius presumably about 1690, but not published until 1747. Hooker cites a mention of the South Seas tacca as "pia" in Capt. Cook's account of his first voyage. Nuttall's article, previously mentioned, states that the plant was first (1791) introduced into England by Capt. Bligh of "Mutiny on the Bounty" fame.

Hooker points out that the bracts of the Pacific form are more rounded and ovate, while those of the "Indian" (Rumphius') form, which is found all the way from the Dutch East Indies to India and around both coasts of Africa, are narrower and more lanceolate. Merrill suggests that this latter and T. involucrata may be the same.

Monsieur Criblet gives a twentieth century account of the preparation of South Sea Arrowroot starch in French Oceania in a recent letter:

"To prepare the starch, the natives peel the tubers, grate them medium coarse, place them on a cloth held by four sticks over a wide, long tub, (usually an old flour bag over a pirogue), ordinary fresh water is then poured over the Tacca, which is stirred frequently, until the water running through the cloth is practically clear. When this is done in the morning, the water is removed from the tub in the afternoon, the starch having settled in the bottom of the tub.

"After this, the starch is thoroughly washed in sea water, this to remove the acrid [poisonous?] matter, which usually floats away on the surface of the water. The water is then drained off and the starch dried on a flat surface in thin layers. The natives use corrugated sheet roofing steel. The result is a very fine and perfectly white starch in powder form.

"The natives make a sort of pudding, called 'poi.' Here is the recipe: two parts cooked fresh fruit, bananas, papayas, guavas, taro or breadfruit, mix with one part of Tacca powder, wrap in banana leaves and cook in Himaa (clam bake style) or one can cook in a regular oven in a flat cake pan until done. This gives a some-

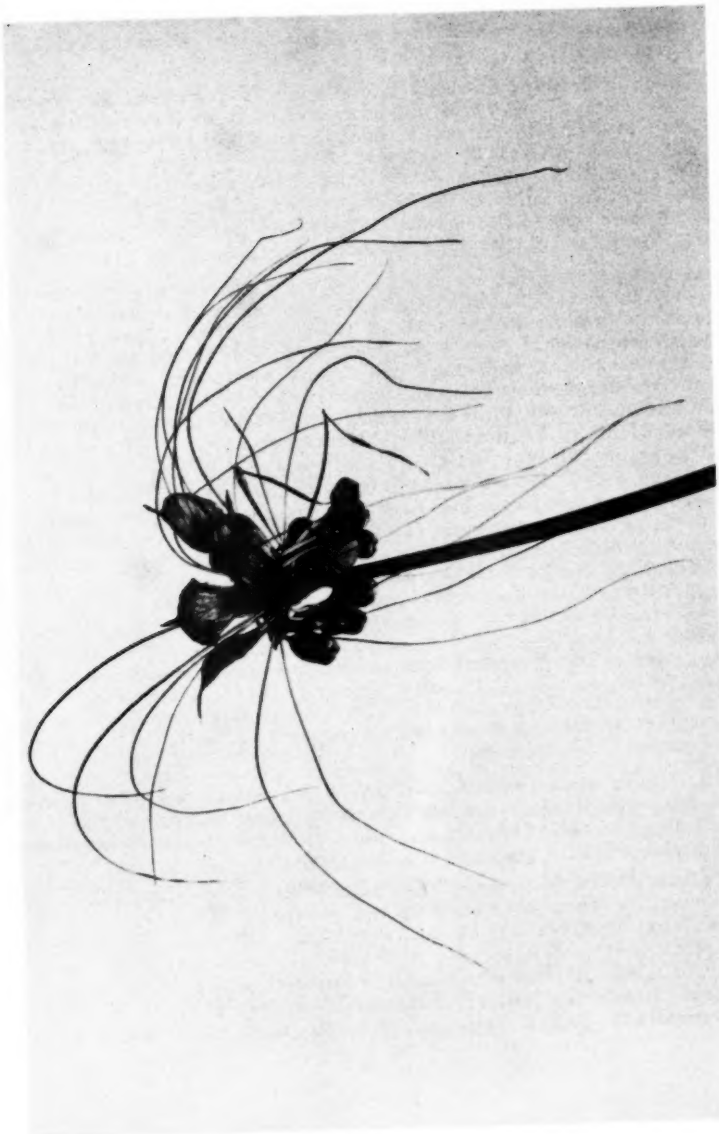

Fig. 27. Tacca Leontopetaloides: the inflorescence, in bud. The outer bracts are erect, the inner bracts are arching-pendent.

what sticky paste, to which one adds, when cold, sugar and coconut milk to suit, and it really is pretty good, like a cornstarch or tapioca pudding."

No doubt a number of other Tacca species, including T. involucrata Schumacher and Thonning of central and west Africa (which Merrill considers may be just another form of T. Leontopetaloides), T. maculata Seemann, T. palmata Blume, T. laevis Roxburgh, and others should be mentioned here as of more or less importance in native cultures and in Eastern gardens of transplanted Europeans. These would be grown largely as primitive medicinal, folklore, food, and decorative subjects.

The early history of the taccas and their nomenclature is more than usually interesting, and similarly confusing. The name Tacca of Rumphius was first published in 1750, in volume 5 of his "Herbarium Amboinense." The first illustrations of Tacca (as Leontopetaloides) had been published previously by Johann Ammann, in 1741, in Commentarii Academiae Scientiarum Imperialis Petropolitanae - two excellent plates (reprinted by Merrill in 1945) with a good description. Ammann's illustrations represented a plant of Tacca Leontopetaloides which by some extraordinary chance had reached the Royal Botanic Gardens of the Imperial Czars! This publication was the basis for Linnaeus' name, in the first edition of his "Species Plantarum" (1753), Leontice Leontopetaloides. [Linnaeus' genus Leontice comprised three species now regarded as members of the Berberidaceae, as well as L. Leontopetaloides, now a member of the Taccaceae. The generic name Leontice was retained for one of the berberidaceous species, so that the entirely unrelated L. Leontopetaloides had to be transferred to another genus. - Ed.] The Ammann text and plates were the basis also for the publication by Georg Rudolph Boehmer in the year 1760 of the generic name Leontopetaloides, later invalidated by the Fourth International Botanical Congress (Brussels) in favor of the name Tacca, which was conserved.

The "Herbarium Amboinense" has a valuable article in Dutch, with Latin translation, on the species Tacca Leontopetaloides, which Rumphius called Tacca litorea. He gives an excellent plate of this and also of T. palmata (his T. montana).

A plate (No. 21) bearing the Indian plant-name Katu-Schena had previously been published in the celebrated "Hortus Indicus Malabaricus," volume 11, by the early Dutch administrator-botanist in India and contemporary of Rumphius, Rheede tot Draackestein, which has by some researchers been considered a species of Tacca. Rumphius' editor, Johannes Burman, referred to it under Rumphius' Tacca montana, but Dr. C. G. G. J. Van Steenis,

general editor of the new and exhaustive "Flora Malesiana," writes (1956) "I have compared this plate in the herbarium with Tacca palmata, but it is certainly no Tacca!" Dr. Van Steenis reports that the plate has been variously identified as Arum pentaphyllum Linnaeus, Podophyllum trilobum Linnaeus, and more recently by Engler (in "Das Pflanzenreich," Heft 73 [IV. 23F]: 120), as Typhonium gracile (Roxburgh) Schott. Rheede's plate is a handsome large engraving showing a palmate-leaved tuberous-rooted plant, but without flowers indicated. This information is given here rather fully, as Rheede's work is very rare in American libraries.

After Boehmer's reference to T. Leontopetaloides, the next published material of note regarding the genus was the name Chaitea Tàcca in Sydney Parkinson's "Journal of a Voyage to the South Seas" (1773), recounting the ill-fated young artist's impressions and observations while travelling as botanical assistant on Cook's first voyage, in 1769. This was an unauthorized and unofficial account of the voyage and the name Chaitea Tacca was taken from Daniel Carl Solander's manuscript "Flora of Tahiti," compiled during the same voyage. Solander was a pupil of Linnaeus and accompanied Sir Joseph Banks on the voyage as botanist. Solander's "Flora" remains unpublished in the British Museum.

Dr. Merrill has explained in extenso in his last book, "The Botany of the Cook Voyages" (1954), why he does not accept Chaitea Tacca Solander ex Parkinson, mainly on the ground that Parkinson's description is not adequate as published. The text of what Parkinson had to say about the plant as observed in Tahiti is interesting enough to repeat: "The root of this plant, properly prepared, makes an excellent strong jelly, like to blanc mange, of the nature of salop, for which it is very justly admired by these islanders."

The first official post-Linnaean publication of the genus name Tacca was in Johann and Georg Forster's "Characteres Generum Plantarum," also an unauthorized if not pirated work on the second Cook voyage. Johann Forster and his son Georg were naturalists on the expedition, and their book described various plants collected en route. In this, although Johann Forster was a good botanist, he showed surprising ignorance of the prior literature when he established our T. Leontopetaloides as T. pinnatifida. This generic name, Tacca, was borrowed, of course, from Rumphius, and it was not until 1891 that Otto Kuntze combined it with the proper Linnaean specific epithet. Rumphius' name Tacca had appeared in print in his great work as cited, in 1750, but being pre-Linnaean, would have no botanical standing under the present rules, without the 1776 republication of it by the Forsters.

Systematically, the Taccaceae or Tacca family belongs to the order Liliiflorae or Liliales, and the suborder Liliineae, close to the Velloziaceae, and the Dioscoreaceae, according to the Engler and Diels treatment. This same suborder also contains the Amaryllidaceae, the Liliaceae, the Stemonaceae, and the Haemadoraceae.

The genus Schizocapsa, with two species in Siam and southern China, is the only other genus in the Taccaceae[1]. The genera Tacca and Schizocapsa are rather similar, and Limpricht says that S. plantaginea is sometimes found in collections under the name "T. viridis."

Both Limpricht in "Das Pflanzenreich" and Ferdinand Pax in his treatment of the Taccaceae in "Die natürlichen Pflanzenfamilien" agree on the division of the Tacca species into three groups, based mainly on the form of the leaves: Section 1, Ataccia, includes those species with entire leaves; Section 2, Palmotacca, those with palmatisect leaves; and Section 3, Eutacca (now section Tacca, according to the present rules), those with palmatisect leaves, the main divisions of which are pinnatifidly cut.

The foliage of T. Leontopetaloides and possibly of others of Section 3 is so much cut, and the general appearance is so similar to that of leaves of Amorphophallus campanulatus, that the two have been confounded even by expert botanists in the past when the flowers were not available for examination. Rumphius mixed parts of the two species in his text and plate 113 (Tacca phallifera). Dr. Degener writes of collecting tubers in Fiji a few years ago, under the impression that he had some new species of Tacca, only to find when they bloomed later at Honolulu that the plant was the old familiar Amorphophallus campanulatus Blume.

There is a general belief among ethno-botanists that both Tacca Leontopetaloides and Amorphophallus campanulatus were widely spread throughout the Pacific area by man in the early settlement of the island groups. Tacca Chantrieri, on the other hand, not being a food plant, has had to depend on modern ornamental-horticulturists for its world travels. It is succeeding to the "number one" position among cultivated taccas, as the culture of Tacca Leontopetaloides dies out and cheap American starchy pudding-mixes become generally available in the Far East and Pacific areas.

[1] The writer has been able to study and grow briefly a small plant of Schizocapsa plantaginea, provided by the Bailey Hortorium. The species offers interesting horticultural possibilities and seems to have the same hardy and thrifty qualities of Tacca Chantrieri, having already survived a sharp frost while growing in a pot under a tree at Winter Park, Florida in January 1957. The leaves are decidedly plantain-like. Dr. Dress reports a plant of S. plantaginea has been growing in the conservatory at Cornell University for many years.

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# The Leopard Plant is Ligularia tussilaginea

George H. M. Lawrence

The genus Ligularia, a member of the Compositæ, consists of about 35 species of hardy, mostly Asiatic perennials, sometimes grown in the border. As a group they do best in a location that is somewhat shady and moist.

It is closely allied to Senecio, differing from that genus in the involucral bracts' having wide membranous margins that are overlapped so that the upper half of the involucre appears as if composed of a double row of bracts. In Senecio the involucral bracts are in a single series, are not broadly winged, and do not appear apically as if in a double series. The genus Ligularia was separated from Senecio by Cassini in 1816.

Of the several species cultivated for ornament, perhaps none is more common than the Leopard Plant, passing in much of the literature, and in the trade, as Ligularia Kæmpferi. It is a low-growing species, with more or less kidney-shaped, shallowly toothed basal leaves, producing in late summer flowering stalks 4-7 dm. in height. The heads are 3-6 cm. across, bright yellow in color.

A review of the nomenclature of this plant, made recently on request of A. Byrd Graf of the Julius Roehrs Company, shows the correct name of the species to be Ligularia tussilaginea. The plant has long been known in gardens and to botanists. Its history is of more than passing interest.

Linnæus knew the plant from a Japanese collection by Kleynhoff and named it (1767) Tussilago japonica. The next botanist to describe it was Nicolas L. Burman, of Leiden, who named it Arnica tussilaginea (1768), apparently unaware of Linnæus' earlier name. In his description, based on a specimen from Japan, he cited (and "borrowed") the earlier description by Leonard Plukenet, a British physician of the late 17th Century. Plukenet called the plant a Doronicum, but his figure (published in 1705, and reproduced here as Fig. 28) is clearly that of the plant in question. Plukenet described his plant as a native of "Insula Cheusan."

In 1835 Siebold and Zuccarini encountered the plant, recognized it as a Ligularia, and named it Ligularia Kæmpferi. Two years

later De Candolle, rejecting Ligularia as a valid genus, reinstated the plant in Senecio, calling it Senecio Kæmpferi, but not mentioning Siebold & Zuccarini's earlier use of the epithet. De Candolle did, however, cite Burman's Arnica tussilaginea in synonymy.

The application of the epithet japonica as applied to this species by Linnæus must be explained. The nomenclature Code provides that, barring certain conditions, the oldest epithet given a species (after 1753) is to be retained, no matter under what genus it may be placed. Japonica is the oldest epithet for this species. However, the Code provides also that once an epithet has been used for a species in a particular genus, it may not be used later in that genus for a different species. In 1832, C. F. Lessing of Germany transferred Senecio japonicus of Schultz to Ligularia, making the new combination of Ligularia japonica. This is a different species from the subject of this paper. Since no one had transferred Linnæus' name to Ligularia by 1832, it could not be done after that, because a later homonym would then be created. Later homonyms are illegitimate names.

This situation was studied and reviewed by the Japanese botanist, Tomitaro Makino, in 1904. Following study of the situation as reviewed above, it was clear that the earliest available epithet for the plant was not Kæmpferi but Burman's tussilaginea. For the species

Fig. 28. Ligularia tussilaginea, from Plukenet's, Amaltheum Botanicum, pl. 390, fig. 6 (1705).

Makino made the new and correct combination of Ligularia tussilaginea.

The botanical name and synonymy of the species is:

Ligularia tussilaginea (Burman f.) Makino in Botanical Magazine (Tokyo), p. 52 (1904).

Tussilago japonica Linnæus in Mantissa 1: 113 (1767), not Ligularia japonica Lessing (1832).

Arnica tussilaginea Burman f., Flora Indica, p. 182 (1768); based on illustration in Plukenet, Amaltheum Botanicum, pl. 390, fig. 6 (1705).

Ligularia Kæmpferi Siebold & Zuccarini, Flora Japonica 1: 77, pl. 35 (1835).

Senecio Kæmpferi De Candolle, Prodromus Systematis Naturalis Regni Vegetabilis 6: 363 (1837).

Senecio tussilaginea (Burman f.) O. Kuntze, Revisio Generum Plantarum 1: 364 (1891).

Two cultivars of the Leopard Plant are grown. One, 'Aureo-maculata', with golden yellow flecks and blotches on the foliage, has been known in European gardens since 1862, when it was figured by Hooker in Curtis' Botanical Magazine (vol. 88, pl. 5302). The other, 'Argentea', has silvery-white blotches on the foliage and is less commonly grown. Both are now listed in catalogues under the name Ligularia Kæmpferi.

The cultivar 'Aureo-maculata' is currently offered in the United States by Merry Gardens, Camden, Me.; Julius Roehrs, Rutherford, N.J.; Oakhurst Gardens, 512 East Foothill Blvd., Arcadia, Calif.; and Logee's Greenhouses, 55 North St., Danielson, Conn.

The cultivar 'Argentea' is available from Logee, Oakhurst Gardens, and Roehrs. The typical non-variegated form of the species may be obtained from Oakhurst Gardens; from California Jungle Gardens, 11977 San Vicente Blvd., Los Angeles 49, Calif.; and from Edmund Riggs, St. Martinsville, La.

Other species of Ligularia currently available in the domestic trade include: Ligularia altaica, L. Clivorum, L. Hodgsonii, L. macrophylla, L. speciosa, and L. Veitchiana.

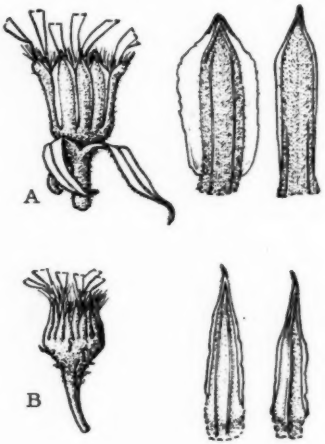
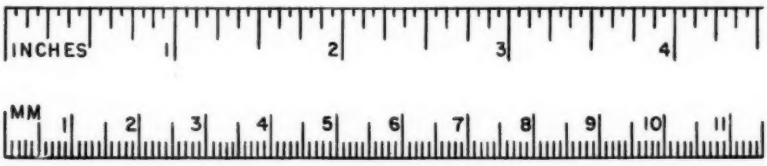



Fig. 29. Involucre and bracts of: A, Ligularia tussilaginea; B, Senecio confusus.

## ABBREVIATIONS USED IN BAILEYA

| | | | | | |
|---|---|---|---|---|---|
| ann. | annual | dm. | decimeter | lf. | leaf |
| bien. | biennial | fl. | flower | lft. | leaflet |
| br. | branch | fls. | flowers | lvs. | leaves |
| brt. | branchlet | flt. | floret | mm. | millimeter |
| caps. | capsule | fr. | fruit | per. | perennial |
| cl. | clone | ft. | foot | segm. | segment |
| cm. | centimeter | hort. | horticultural | st. | stem |
| cv. | cultivar | in. | inch | sts. | stems |
| diam. | diameter | infl. | inflorescence | var. | variety |

## METRIC - ENGLISH EQUIVALENTS (approximate)

| | | |
|---|---|---|
| 6 mm. - 1/4 in. | 10 cm. - 4 in. | 10 mm. - 1 cm. |
| 12 mm. - 1/2 in. | 1 dm. - 4 in. | 10 cm. - 1 dm. |
| 25 mm. - 1 in. | 3 dm. - 1 ft. | 10 dm. - 1 meter |
| 2.5 cm. - 1 in. | 10 dm. - 1 yd. | |
| 5 cm. - 2 in. | 1 m. - 39 in. | |